Thoughts For the Month--May 2019 (14 + 14 = 31)

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ALL ABOUT THAT BASE!

In 1965, a popular newswriter for the Associated Press wrote a story that was to become one of the best known in the history of arithmetic. Here is part of what Ms. (known then as Miss or Mrs.) Mueller wrote in the article 54 years ago that was published in many newspapers:

Did you know that 14 plus 14 equals 31?

It's true, although not in the number system we use. It adds up to 28, of course, in our system "to the base 10." But if we use a base of 7, the sum of 14 plus 14 would be 31.

When we write the number 132, what we mean is 1 times 100, plus 3 times 10, plus 2 times 1. Similarly, 17 is actually 1 times 10, plus 7 times 1.

Most people, of course, never think this out when they write down a number...As you know, we count in groups of 10--we have a "base" of 10. Why this is, we don't know for certain.

But we can visualize a shepherd of ancient times, counting his sheep on his fingers. Each time a sheep went by, he would place a small stone on the ground to mark its passage. But this became a bother, there were too many sheep. So whenever he had 10 small stones--the same number as fingers--he would use a larger stone. Then, when he had 10 of these stones, he would use an even larger stone to signify 10 groups of 10 each, or 100.

...But supposing this shepherd had only seven fingers? Then what would he have done? The same thing. The small stone would still represent one sheep. But now each medium-sized stone would each represent a group of 7 sheep, and each large stone would represent a group of 49 sheep--7 groups of 7 each.

...This would be described today (since 1965) as "461 to the base 7." or just the numeral 461 with a small "figu"; 7 to the right and below the figure 1...Of course, we can use other numbers as a base in addition to 10 and 7. A shepherd with only five fingers, for instance, would count the same number of sheep and end up with 1,424 to the base 5...When you add 4 and 4, the answer can't be 8, because there is no 8 in the base seven. Just as any number over 9 8's "carried over" in the base 10, so is any number over 6 carried over in the base 7.

...Two plus 2 is 100 in the base 2, 11 in the base 3, 10 in the base 4, and 4 in the bases 5, 6, 7, 8, 9, and 10. That'll teach 'em a thing or three!